



SHD/645
#4
10.23-02
PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicants: Nicholas L. Abbott
Rahul R. Shah

Date: December 3, 2001

Docket No.: 32026:0573

Serial No.: 09/931,635

Group Art Unit: 463

Filed: August 16, 2001

For:

DETECTING COMPOUNDS WITH LIQUID CRYSTALS

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Washington, D.C. 20231 on December 3, 2001.

Bernard P. Friedrichsen

(Name of applicant, assignee
or Registered Representative)

(Signature)

December 3, 2001

(Date of Signature)

INFORMATION DISCLOSURE STATEMENT

Commissioner for Patents
Washington, D.C. 20231

Dear Commissioner:

Submitted herewith on Form PTO-1449 and presented below is a listing of documents known to Applicants in order to comply with Applicants' duty of disclosure pursuant to 37 C.F.R. §1.56. A copy of each listed document is being submitted to comply with the provisions of 37 C.F.R. §§1.97 and 1.98.



UNITED STATES PATENTS

<u>Inventor(s)</u>	<u>Patent No.</u>	<u>Date Issued</u>
Abbott, et al.	6,284,197 B1	September 4, 2001
Abbott, et al.	6,288,392 B1	September 11, 2001

FOREIGN PATENTS

<u>Inventor(s)</u>	<u>Patent No.</u>	<u>Publication Date</u>	<u>Country</u>
Abbott, et al.	WO 99/63329	9 December 1999	PCT
Woolverton, et al.	WO 99/64862	16 December 1999	PCT

OTHER DOCUMENTS

Ferguson, J., "Liquid Crystals," *J. Sci. Amer.*, Vol. 211, pp. 77-83, 1964; published by Scientific American, Inc., New York, New York.

Ferguson, J., et al., "Thermal Radiography Utilizing Liquid Crystals," *Mol. Cryst. Liq. Cryst.*, Vol. 13, pp. 149-164, 1971; published by Gordon and Breach Science Publishers, printed in England.

Novak, T. J., et al., "Use of Anisotropic Materials as Chemical Detectors," *Analytical Letters*, Vol. 5, No. 3, pp. 187-192, 1972; Marcel Dekker, Inc., New York, New York

Pozniomek, E. J., et al., "Use of Liquid Crystals as Vapor Detectors," *Mol. Cryst. Liq. Cryst.*, Vol. 27, pp. 175-185, 1973; published by Gordon and Breach Science Publishers, Ltd., printed in Dordrecht, Holland.

Kolesar, Jr., E., "Organophosphorus Compound Detection with a Supported Copper + Cuprous Oxide Island Film. 1. Gas-Sensitive Gilm Physical characteristics and Direct Current Studies," *Anal. Chem.*, Vol. 60, No. 17, pp. 1731-1736, September 1, 1988; published by American Chemical Society, Washington, D.C.

Kolesar, Jr., E., et al., "Organophosphorus Compound Detection with a Supported Copper + Cuprous Oxide island Film. 2. Alternating Current Studies and Sensor

Performance," *Anal. Chem.*, Vol. 60, No. 17, pp. 1737-1743, September 1, 1988; published by American Chemical Society, Washington, D.C.

Pieranski, P., et al., "Adsorption-Induced Anchoring Transitions at Nematic-Liquid-Crystal-Crystal Interfaces," *Physical Review A*, Vol. 40, No. 1, pp. 317-322, July 1, 1989; published by The American Physical Society, Washington, D.C.

Nuzzo, R. G., et al., "Fundamental Studies of Microscopic Wetting on Organic Surfaces. 1. Formation and Structural characterization of a Self-Consistent Series of Polyfunctional Organic Monolayers," *J. Am. Chem. Soc.*, Vol. 112, pp. 558-569, 1990; published by the American Chemical Society, Washington, D.C.

Bechhoefer, J., et al., "Systematic studies of the anchoring transition in nematic liquid crystals," *Physical Review A*, Vol. 41, No. 6, pp. 3187 - 3191, March 15, 1990; published by The American Physical Society, Washington, D.C.

Pieranski, P., et al., "Adsorption-Induced Anchoring Transitions," *Mol. Cryst. Liq. Cryst.*, Vol. 179, pp. 285-315, 1990; published by Gordon Breach Science Publishers S.A., printed in the United States of America.

Bechhoefer, J., et al., "Anchoring Transitions of Nematic Liquid Crystals," *Phase Trans.*, Vol. 33, pp. 227-236, 1991; published by Gordon Breach Science Publishers S.A., printed in England.

Kepley, L. J., et al., "Selective Surface Acoustic Wave-Based Organophosphonate Chemical Sensor Employing a Self-Assembled Composite Monolayer: A New Paradigm for Sensor Design," *Anal. Chem.*, Vol. 64, pp. 3191-3193, December 15, 1992; published by American Chemical Society, Washington, D.C.

Butler, M. A., et al., "Fiber Optic Micromirror Studies of the Interaction of Thin Copper Films with an Organophosphonate," *Anal. Chem.*, Vol. 64, No. 17, pp. 1851-1854, September 1, 1992; published by American Chemical Society, Washington, D.C.

Milanko, O. S., et al., "Evaluation of coating materials used on piezoelectric sensors for the detection of organophosphorus compounds in the vapour phase," *Anal. Chim.*

Acta, Vol. 269, pp. 289-300, 1992; published by Elsevier Science Publishers B.V., Amsterdam, Holland.

Jerome, B., et al., "Anchoring of nematic liquid crystals on mica in the presence of volatile molecules," *Physical Review E*, Vol. 48, No. 6, pp. 4556-4574, December 1993; published by The American Physical Society, Washington, D.C.

Yao, S., et al., "Circuit network analysis method applied to surface acoustic wave impedance system in liquids," *Anal. Chim. Acta*, Vol. 294, pp. 311-318, 1994; published by Elsevier Science Publishers B.V., Amsterdam, Holland.

Drawhorn, R. A., et al., "Anchoring of Nematic Liquid Crystals on Self-Assembled Monolayers Formed from Alkanethiols on Semitransparent Films of Gold," *J. Phys. Chem.*, Vol. 99, No. 45, pp. 16511-16515, 1995; published by American Chemical Society, Washington, D.C.

Yang, L., et al., "Chemical Sensing Using Sol-Gel Derived Planar Waveguides and Indicator Phases," *Anal. Chem.*, Vol. 67, No. 8, pp. 1307-1314, April 15, 1995; published by American Chemical Society, Washington, D.C.

Gupta, V. K., et al., "Azimuthal anchoring transition of nematic liquid crystals on self-assembled monolayers formed from odd and even alkanethiols," *Physical Review E*, Vol. 54, No. 5, pp. R4540-R4543, November 1996; published by The American Physical Society, Washington, D.C.

Gupta, V. K., et al., "Uniform Anchoring of Nematic Liquid Crystals on Self-Assembled Monolayers Formed from Alkanethiols on Obliquely Deposited Films of Gold," *Langmuir*, Vol. 12, No. 10, pp. 2587-2593, 1996; published by American Chemical Society, Washington, D.C.

Yang, H. C., et al., "Molecular Interactions between Organized, Surface-Confined Monolayers and Vapor-Phase Probe Molecules. 8. Reactions between Acid-Terminated Self-Assembled Monolayers and Vapor-Phase Bases," *Langmuir*, Vol. 12, No. 3, pp. 726-735, 1996; published by American Chemical Society, Washington, D.C.

Wells., M., et al., "Interactions between Organized, Surface-Confined Monolayers and Vapor-Phase Probe Molecules. 9. Structure/Reactivity Relationship between Three Surface-Confined Isomers of Mercaptobenzoic Acid and Vapor-Phase Decylamine," *Langmuir*, Vol. 12, No. 8, pp. 1989-1996, 1996; published by American Chemical Society, Washington, D.C.

Crooks, R. M., "Interactions between self-assembled monolayers and an organophosphonate," *Faraday Discuss.*, Vol. 107, pp. 285-305, 1997; published by the Royal Society of Chemistry, London, England.

Delamarche, E., et al., "Patterned Delivery of Immunoglobulins to Surfaces Using Microfluidic Networks," *Science*, Vol. 276, pp. 779-781, May 2, 1997; published by American Association for the Advancement of Science, Washington, D.C.

Jenkins, A. L., et al., "Polymer Based Lanthanide Luminescent Sensors for the Detection of Nerve Agents," *Anal. Comm.*, Vol. 34, pp. 221-224, August 1997; published by the Royal Society of Chemistry, London, England.

Gupta, V. K., et al., "Optical Amplification of Ligand-Receptor Binding Using Liquid Crystals," *Science*, Vol. 279, pp. 2077-2080, March 27, 1998; published by American Association for the Advancement of Science, Washington, D.C.

Ricco, A. J., et al., "Surface Acoustic Wave Chemical Sensor Arrays: New Chemically Sensitive Interfaces Combined with Novel Cluster Analysis To Detect Volatile Organic Compounds and Mixtures," *Acc. Chem. Res.*, Vol. 31, No. 5, pp. 289-296, 1998; published by American Chemical Society, Washington, D.C.

Crooks, R. M., et al., "New Organic Materials Suitable for Use in Chemical Sensor Arrays," *Acc. Chem. Res.*, Vol. 31, No. 5, pp. 219-227, 1998; published by American Chemical Society, Washington, D.C.

Swager, T. M., "The Molecular Wire Approach to Sensory Signal Amplification," *Acc. Chem. Res.*, Vol. 31, No. 5, pp. 201-207, 1998; published by American Chemical Society, Washington, D.C.

Shah, R. R., et al., "Using Liquid Crystals To Image Reactants and Products of Acid-Base Reactions on Surfaces with Micrometer Resolution," *J. Am. Chem. Soc.*, Vol. 121, No. 49, pp. 11300-11310, 1999; published by American Chemical Society, Washington, D.C.

Skaife, J. J., et al., "Quantitative Characterization of Obliquely Deposited Substrates of Gold by Atomic Force Microscopy: Influence of Substrate Topography on Anchoring of Liquid Crystals," *Chem. Mater.*, Vol. 11, No. 3, pp. 612-623, 1999; published by American Chemical Society, Washington, D.C.

Bertilsson, L., et al., "On the Adsorption of Dimethyl Methylphosphonate on Self-Assembled Alkanethiolate Monolayers: Influence of Humidity," *Langmuir*, Vol. 15, No. 4, pp. 1128-1135, 1999; published by American Chemical Society, Washington, D.C.

Jenkins, A. L., et al., "Polymer-Based Lanthanide Luminescent Sensor for Detection of the Hydrolysis Product of the Nerve Agent Soman in Water," *Anal. Chem.*, Vol. 71, No. 2, pp. 373-378, January 15, 1999; published by American Chemical Society, Washington, D.C.

Niculescu, M., et al., "Redox Hydrogel-Based Amperometric Bienzyme Electrodes for Fish Freshness Monitoring," *Anal. Chem.*, Vol. 72, No. 7, pp. 1591-1597, April 1, 2000; published by American Chemical Society, Washington, D.C.

Shah, R. R., et al., "Coupling of the Orientations of Liquid Crystals to Electrical Double Layers formed by the Dissociation of Surface-Immobilized Salts," *J. Phys. Chem.*, Vol. 105, No. 21, pp. 4936-4950, 2001; published by American Chemical Society, Washington, D.C.

REMARKS

The submission of any document herewith, which is not a statutory bar, is not intended as an admission that such document constitutes prior art against the claims of the present application or that this document is considered material to patentability as defined in 37 C.F.R. §1.56. Patentee does not waive any right to take any action which would be

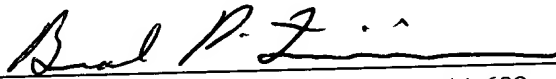
appropriate to antedate or otherwise remove as a competent reference any document which is determined to be a *prima facie* prior art reference against the claims of the present reexamination patent.

Applicants believe that this Information Disclosure Statement is being submitted prior to the mailing of an Office Action on the merits as set forth in 37 C.F.R. § 1.97(b)(3). Therefore, Applicants believe that no fee is due for this filing. In the event that an Office Action on the merits has been mailed, then Applicants submit this Information Disclosure Statement under 37 C.F.R. § 1.97(c)(2). Should any fee be due, the Patent Office is hereby authorized to charge any fees required for this filing to deposit account no. 06-1447. For the purpose of charging said deposit account, a duplicate of this document is submitted herewith.

It is requested that the foregoing documents be considered during examination of the accompanying application and be made of record therein.

Respectfully Submitted,

12/03/2001
Date


Bernard P. Friedrichsen, Reg. No. 44,689
Attorney for Applicants
Foley & Lardner
150 East Gilman Street
Post Office Box 1497
Madison, Wisconsin 53701-1497
(608) 258-4281

FORM PTO 1449 (modified)
U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
LIST OF REFERENCES CITED BY APPLICANT(S)
(Use several sheets if necessary)
Date Submitted to PTO: December 03, 2001

ATTY DOCKET NO.
032026:0573

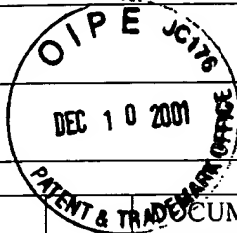
SERIAL NO.
09/931,635

RECEIVED
DEC 13 2001
TECH CENTER 1600/2900

APPLICANTS
Abbott, et al.

FILING DATE
August 16, 2001

GROUP
1645



U.S. PATENT DOCUMENTS

*EXAMINER INITIAL	DOCUMENT NUMBER	DATE	NAME	CLASS	SUBCLASS	FILING DATE IF APPROPRIATE
	6,284,197 B1	9/4/01	Abbott, et al.			
	6,288,392 B1	9/11/01	Abbott, et al.			

FOREIGN PATENT DOCUMENTS

DOCUMENT NUMBER	DATE	COUNTRY	CLASS	SUBCLASS	TRANSLATION YES/NO/ OR ABSTRACT
WO 99/63329	9 Dec. 1999	PCT			
WO 99/64862	16 Dec. 1999	PCT			

OTHER DOCUMENT(S) (Including Author, Title, Date, Pertinent Pages, Etc.)

	Ferguson, J., "Liquid Crystals," <i>J. Sci. Amer.</i> , Vol. 211, pp. 77-83, 1964.
	Ferguson, J., et al., "Thermal Radiography Utilizing Liquid Crystals," <i>Mol. Cryst. Liq. Cryst.</i> , Vol. 13, pp. 149-164, 1971; published by Gordon and Breach Science Publishers.
	Novak, T. J., et al., "Use of Anisotropic Materials as Chemical Detectors," <i>Analytical Letters</i> , Vol. 5, No. 3, pp. 187-192, 1972; Marcel Dekker, Inc.
	Pozniomek, E. J., et al., "Use of Liquid Crystals as Vapor Detectors," <i>Mol. Cryst. Liq. Cryst.</i> , Vol. 27, pp. 175-185, 1973; published by Gordon and Breach Science Publishers, Ltd.
	Kolesar, Jr., E., "Organophosphorus Compound Detection with a Supported Copper + Cuprous Oxide Island Film. 1. Gas-Sensitive Gilm Physical characteristics and Direct Current Studies," <i>Anal. Chem.</i> , Vol. 60, No. 17, pp. 1731-1736, September 1, 1988
	Kolesar, Jr., E., et al., "Organophosphorus Compound Detection with a Supported Copper + Cuprous Oxide island Film. 2. Alternating Current Studies and Sensor Performance," <i>Anal. Chem.</i> , Vol. 60, No. 17, pp. 1737-1743, September 1, 1988.
	Pieranski, P., et al., "Adsorption-induced anchoring transitions at nematic-liquid-crystal-crystal interfaces," <i>Physical Review A</i> , Vol. 40, No. 1, pp. 317-322, July 1, 1989; published by The American Physical Society.
	Nuzzo, R. G., et al., "Fundamental Studies of Microscopic Wetting on Organic Surfaces. 1. Formation and Structural characterization of a Self-Consistent Series of Polyfunctional Organic Monolayers," <i>J. Am. Chem. Soc.</i> , Vol. 112, pp. 558-569, 1990.

			Bechhoefer, J., et al., "Systematic Studies of the Anchoring Transition in Nematic Liquid Crystals," <i>Physical Review A</i> , Vol. 41, No. 6, pp. 3187 - 3191, March 15, 1990; published by The American Physical Society.
			Pieranski, P., et al., "Adsorption-Induced Anchoring Transitions," <i>Mol. Cryst. Liq. Cryst.</i> , Vol. 179, pp. 285-315, 1990; published by Gordon and Breach Science Publishers S.A., printed in the United States of America.
			Bechhoefer, J., et al., "Anchoring Transitions of Nematic Liquid Crystals," <i>Phase Trans.</i> , Vol. 33, pp. 227-236, 1991; published by Gordon and Breach Science Publishers S.A., printed in the United Kingdom.
			Kepley, L. J., et al., "Selective Surface Acoustic Wave-Based Organophosphonate Chemical Sensor Employing a Self-Assembled Composite Monolayer: A New Paradigm for Sensor Design," <i>Anal. Chem.</i> , Vol. 64, pp. 3191-3193, December 15, 1992.
			Butler, M. A., et al., "Fiber Optic Micromirror Studies of the Interaction of Thin Copper Films with an Organophosphonate," <i>Anal. Chem.</i> , Vol. 64, No. 17, pp. 1851-1854, September 1, 1992.
			Milanko, O. S., et al., "Evaluation of coating materials used on piezoelectric sensors for the detection of organophosphorus compounds in the vapour phase," <i>Anal. Chim. Acta</i> , Vol. 269, pp. 289-300, 1992; published by Elsevier Science Publishers B.V.
			Jerome, B., et al., "Anchoring of nematic liquid crystals on mica in the presence of volatile molecules," <i>Physical Review E</i> , Vol. 48, No. 6, pp. 4556-4574, December 1993; published by The American Physical Society.
			Yao, S., et al., "Circuit network analysis method applied to surface acoustic wave impedance system in liquids," <i>Anal. Chim. Acta</i> , Vol. 294, pp. 311-318, 1994; published by Elsevier Science Publishers B.V.
			Drawhorn, R. A., et al., "Anchoring of Nematic Liquid Crystals on Self-Assembled Monolayers Formed from Alkanethiols on Semitransparent Films of Gold," <i>J. Phys. Chem.</i> , Vol. 99, No. 45, pp. 16511-16515, 1995.
			Yang, L., et al., "Chemical Sensing Using Sol-Gel Derived Planar Waveguides and Indicator Phases," <i>Anal. Chem.</i> , Vol. 67, No. 8, pp. 1307-1314, April 15, 1995; published by American Chemical Society.
			Gupta, V. K., et al., "Azimuthal anchoring transition of nematic liquid crystals on self-assembled monolayers formed from odd and even alkanethiols," <i>Physical Review E</i> , Vol. 54, No. 5, pp. R4540-R4543, November 1996; published by The American Physical Society.
			Gupta, V. K., et al., "Uniform Anchoring of Nematic Liquid Crystals on Self-Assembled Monolayers Formed from Alkanethiols on Obliquely Deposited Films of Gold," <i>Langmuir</i> , Vol. 12, No. 10, pp. 2587-2593, 1996; published by American Chemical Society.
			Yang, H. C., et al., "Molecular Interactions between Organized, Surface-Confined Monolayers and Vapor-Phase Probe Molecules. 8. Reactions between Acid-Terminated Self-Assembled Monolayers and Vapor-Phase Bases," <i>Langmuir</i> , Vol. 12, No. 3, pp. 726-735, 1996; published by American Chemical Society.
			Wells, M., et al., "Interactions between Organized, Surface-Confined Monolayers and Vapor-Phase Probe Molecules. 9. Structure/Reactivity Relationship between Three Surface-Confined Isomers of Mercaptobenzoic Acid and Vapor-Phase Decylamine," <i>Langmuir</i> , Vol. 12, No. 8, pp. 1989-1996, 1996.
			Crooks, R. M., "Interactions between self-assembled monolayers and an organophosphonate," <i>Faraday Discuss.</i> , Vol. 107, pp. 285-305, 1997.
			Delamarche, E., et al., "Patterned Delivery of Immunoglobulins to Surfaces Using Microfluidic Networks," <i>Science</i> , Vol. 276, pp. 779-781, May 2, 1997.

		Jenkins, A. L., et al., "Polymer Based Lanthanide Luminescent Sensors for the Detection of Nerve Agents," <i>Anal. Comm.</i> , Vol. 34, pp. 221-224, August 1997.
		Gupta, V. K., et al., "Optical Amplification of Ligand-Receptor Binding Using Liquid Crystals," <i>Science</i> , Vol. 279, pp. 2077-2080, March 27, 1998.
		Ricco, A. J., et al., "Surface Acoustic Wave Chemical Sensor Arrays: New Chemically Sensitive Interfaces Combined with Novel Cluster Analysis To Detect Volatile Organic Compounds and Mixtures," <i>Acc. Chem. Res.</i> , Vol. 31, No. 5, pp. 289-296, 1998; published by American Chemical Society.
		Crooks, R. M., et al., "New Organic Materials Suitable for Use in Chemical Sensor Arrays," <i>Acc. Chem. Res.</i> , Vol. 31, No. 5, pp. 219-227, 1998; published by American Chemical Society.
		Swager, T. M., "The Molecular Wire Approach to Sensory Signal Amplification," <i>Acc. Chem. Res.</i> , Vol. 31, No. 5, pp. 201-207, 1998; published by American Chemical Society.
		Shah, R. R., et al., "Using Liquid Crystals To Image Reactants and Products of Acid-Base Reactions on Surfaces with Micrometer Resolution," <i>J. Am. Chem. Soc.</i> , Vol. 121, No. 49, pp. 11300-11310, 1999; published by American Chemical Society.
		Skaife, J. J., et al., "Quantitative Characterization of Obliquely Deposited Substrates of Gold by Atomic Force Microscopy: Influence of Substrate Topography on Anchoring of Liquid Crystals," <i>Chem. Mater.</i> , Vol. 11, No. 3, pp. 612-623, 1999; published by American Chemical Society.
		Bertilsson, L., et al., "On the Adsorption of Dimethyl Methylphosphonate on Self-Assembled Alkanethiolate Monolayers: Influence of Humidity," <i>Langmuir</i> , Vol. 15, No. 4, pp. 1128-1135, 1999; published by American Chemical Society.
		Jenkins, A. L., et al., "Polymer-Based Lanthanide Luminescent Sensor for Detection of the Hydrolysis Product of the Nerve Agent Soman in Water," <i>Anal. Chem.</i> , Vol. 71, No. 2, pp. 373-378, January 15, 1999; published by American Chemical Society.
		Niculescu, M., et al., "Redox Hydrogel-Based Amperometric Bienzyme Electrodes for Fish Freshness Monitoring," <i>Anal. Chem.</i> , Vol. 72, No. 7, pp. 1591-1597, April 1, 2000; published by American Chemical Society.
		Shah, R. R., et al., "Coupling of the Orientations of Liquid Crystals to Electrical Double Layers formed by the Dissociation of Surface-Immobilized Salts," <i>J. Phys. Chem.</i> , Vol. 105, No. 21, pp. 4936-4950, 2001; published by American Chemical Society.
EXAMINER		DATE CONSIDERED

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609; Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.